PATENT APPLICATION

IN THE U.S. PATENT AND TRADEMARK OFFICE

Applicants: Yoshiharu HASEGAWA et al

For: ALUMINUM ALLOY PIPING MATERIAL FOR AUTOMOTIVE TUBES HAVING EXCELLENT CORROSION RESISTANCE AND FORMABILITY, AND METHOD OF MANUFACTURING SAME

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Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

DECLARATION UNDER 37 CFR 1.132

I, the undersigned, hereby declare as follows:

I am one of the co-inventors of the invention described and claimed in application Serial No. 10/674 283, filed on September 29, 2003.

I hereby incorporate by reference thereto the contents of Examples 1 and 2 and Comparative Examples 1 and 2 on pages 10-20 of application Serial No. 10/674 283.

I have performed an additional test to illustrate that the process of Sircar et al does not produce an aluminum alloy as required by the present claims.

TEST PROCEDURE

An aluminum alloy having the composition 0.10% Si, 0.30% Fe, 1.00% Mn, 0.02% Cu, 0.18% Ti, 0.06% Zn and the balance being Al and inevitable impurities was formed into billets having a diameter of 100 mm by semi-continuous casting followed by homogenization treatment. The billets were worked by hot extrusion and then cold drawing to form tubes. The formed tubes were annealed at a temperature of 450°C with a

temperature increase rate to 450°C of 300°C per hour. The working and annealing schedules are shown below in Table 1.

Table 1

	Hot-Extruded Tube		Cold Drawn Tube		Reduction Rate of Cold Drawing (%)	Total Reduction Rate (%)
	Outer Diameter (mm)	Thickness (mm)	Outer Diameter (mm)	Thickness (mm)		
Present invention	40	3	18	1	84.7	99.3
Sircar et al	60	6	24	1.5	89.5	98.7

TEST RESULTS

After annealing by following the procedures used in the Examples of the present invention and Sircar et al, U.S. Patent No. 5 976 278, the average grain size at the outer circumferential surface of the specimens and the distribution pattern of Ti-based compounds were measured and the bulge formability and corrosion resistance were evaluated. The results of these measurements and evaluations are shown below in Table 2.

Table 2

	Tensile Strength (MPa)	Average Grain Size (μm)	Ti-based Compounds Distribution (Number)	Bulge Formability	Maximum Corrosion Depth (μm)
Present Invention	100	50	1	○	0.47
Sircar et al	98	80	3	×	0.45

DISCUSSION OF RESULTS

The difference between the aluminum alloys of the present invention and the aluminum alloys of Sircar et al results from the difference in the processing steps. In the present invention, the reduction ratio of cold drawing ≥ 30%, the total reduction rate ≥99% and the temperature increase rate in

annealing ≥200°C per hour. In contrast thereto, in Sircar et al (column 5, lines 13-20), the reduction ratio of cold drawing is 89.5%, the total reduction rate is 98.7% and the temperature increase rate in annealing is not disclosed.

As shown by the above results, the specimen of the present invention had good hot-extrudability and was able to be formed into tubes without any problems during the manufacturing process. The specimen of the present invention had a high tensile strength of 100 MPa, fine average grain size of 50 μm, good bulge formability and maximum corrosion depth of 0.47 mm.

In contrast to the aluminum alloy of the present invention, in the specimen formed by the process of Sircar et al, the dispersion of Ti-based compounds formed during casting was prevented because of an insufficient total reduction ratio and the bulge formability was inferior.

I hereby declare that all statements made herein of my own knowledge are true, and that all statements made on information and belief are believed to be true; and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Dated: July 4, 2006

Takahiro Koyama
Takahiro KOYAMA